Building of Intelligent Transport Systems

Berthold Jansen

Building of
Intelligent Transport Systems

Simply put together

- Computer
- Software Platform
- Traffic Algorithms

Don't do it this way!

Put the cart before the horse!
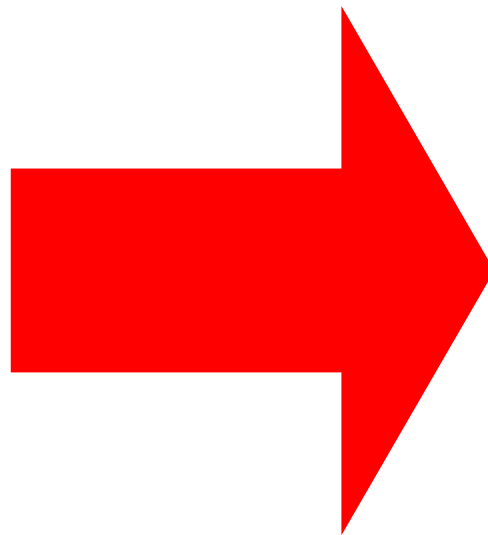
You have already built and installed an Intelligent Transport System

Now what?
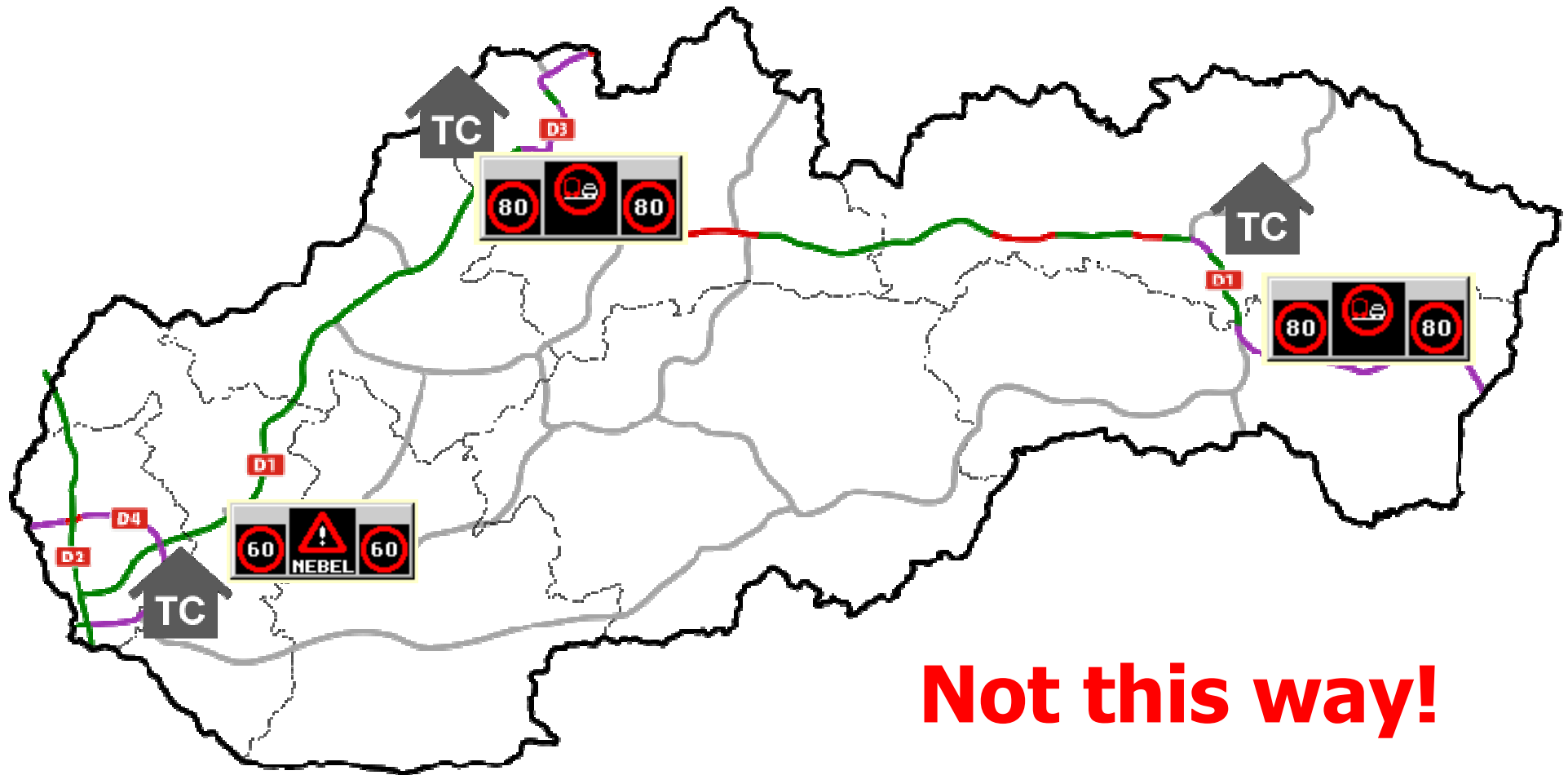
You have to run it.
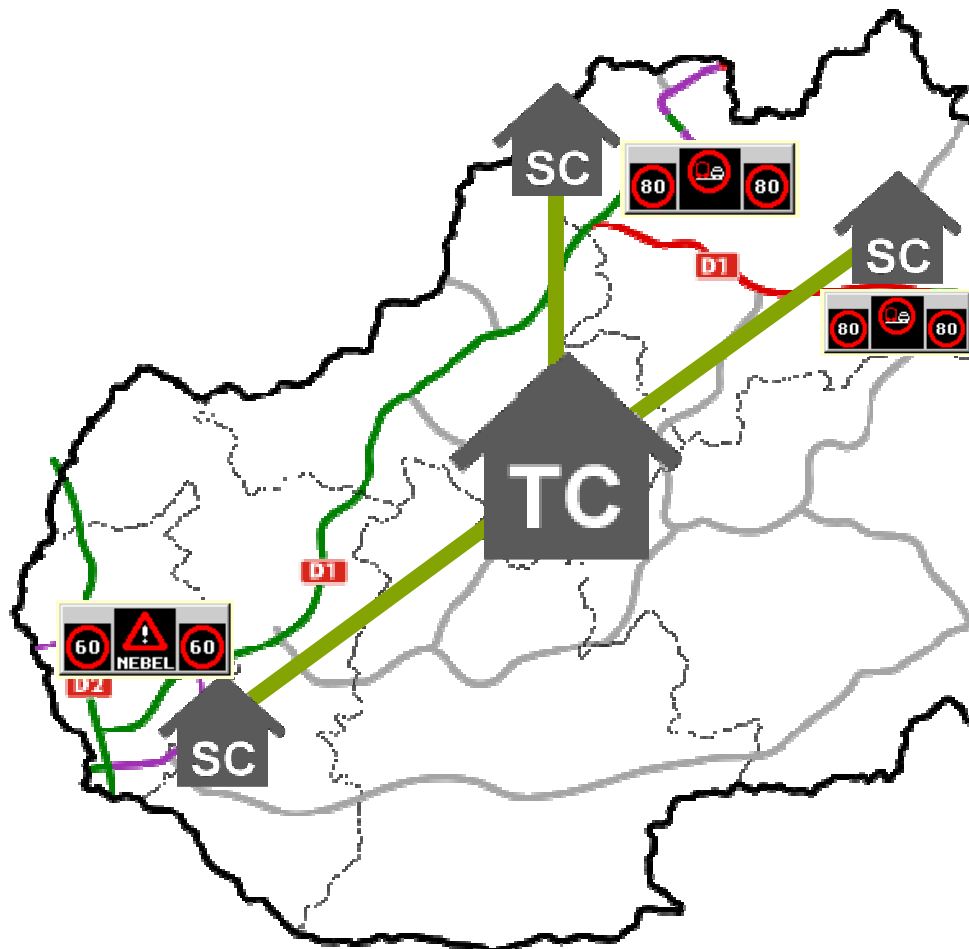
- Operating
- Services
- Organisation

Goal settings:

- High quality of traffic performance
- Cost effective
- Developable
- Maintainable

Deploy single, isolated, but optimized systems?

Not this way!
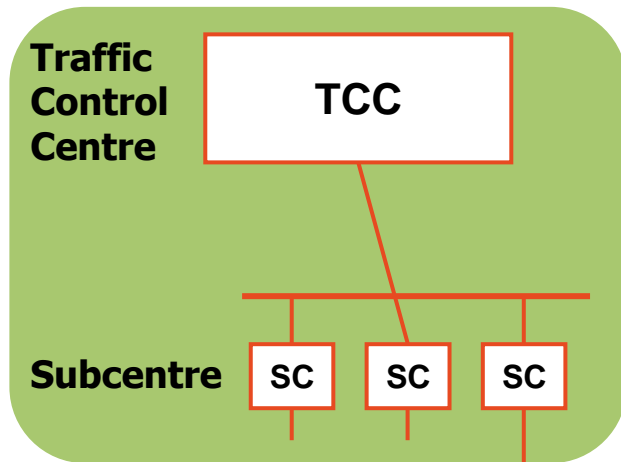
Solution

One Centre, One Software

Central Data Management

Detectors
Multiple use for
- Local traffic management
- National rerouting
- Traffic information (RDS-TMC, TPEG)
- Statistics
- Forecast

# System Architecture for Automatic Detection and Control

Traffic Control Centre

TCC

All Intelligence is here

Intelligent software & tools for
- **Area wide traffic management (network control)**
- **Automatic rerouting**
- **Consideration of roadwork**
- **Creation of TMC-Messages**

Subcentre SC SC SC

Intelligent software for
- **Data completion**
- **section-wide interpolation**
- **fallback strategies**
- **Forecast**
- **etc.**

Out-Station OS OS OS OS OS

Variable Message Signs

Detection (Loops, cameras etc.)

80   80   Camera

Alternative Routing
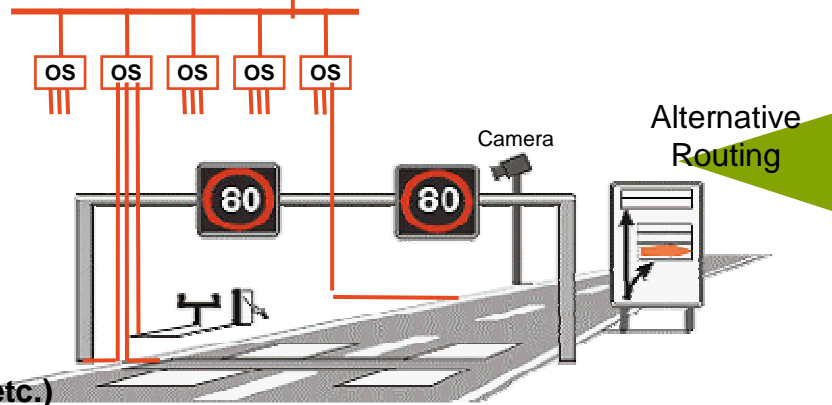
- **Traffic detection points using means like loops, cameras**
- **Other detections than traffic, like weather (fog, ice, precipitation etc.)**
- **Variable message signs**
- **Variable direction signs**

Content-related Structure

Monitoring

- Successful traffic management requires the best achievable knowledge about the actual traffic situation. This concerns both, the current traffic situation as well as predictions.

Optimisation

- Based on the current and predicted traffic situations, an improvement of the traffic flow can be achieved using appropriate traffic control methods.

Traffic Control

- In order to locally improve traffic flow our systems use various methods to analyse sensor data for traffic and environment and determine control measures that can be triggered automatically.

Safety

- Increasing traffic safety is a major objective of our systems. One way this can be achieved is by reducing the risk of accidents using traffic control and hazard warning.

Information

- Traffic information as a service of the road operator pays off twice. Well informed road users are satisfied customers, and they take their own decisions: they avoid congestion and help preventing accidents.

IT Architecture

- Service oriented architecture (SOA) based on SOAP web-services
  - easily scalable if all implemented services are „stateless"
  - individual, customer focused integration of components
  - Proven and mature components from different domains can be plugged together and can be integrated into a new, tailor-made - to region and costumer - system

Special ITS – Feature
- Hybrid Architecture -

- **DATA-BUS** serves for the high data traffic

- **SERVICE-BUS** serves for easy integration of functionality
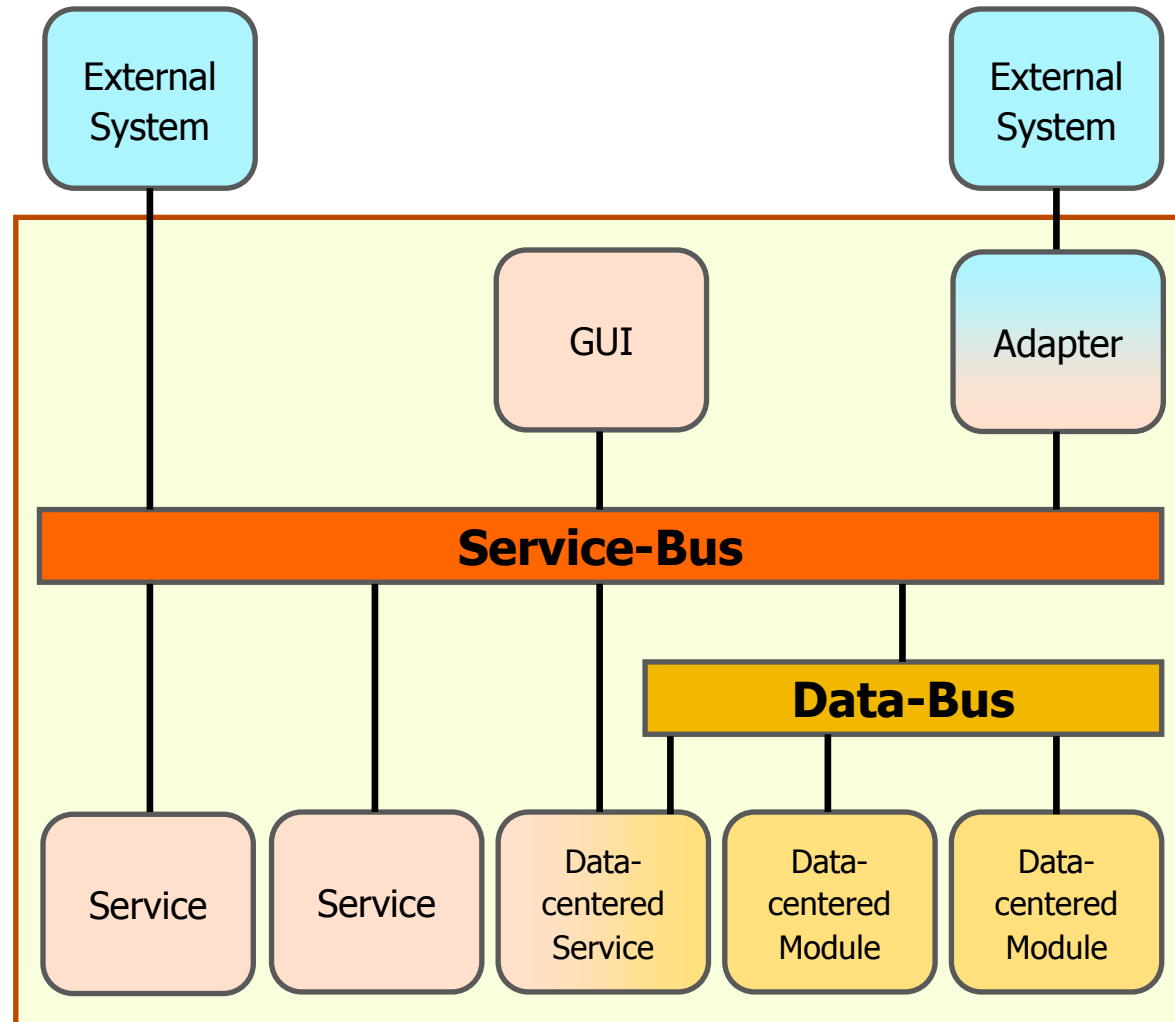
Special ITS – Feature
- Geo-Referencing -

- Essential functionality

- Geo-Data Service
  - Convertion between all reference systems
    - Metering / mile posting
    - RDS-TMC location references
    - TPEG-LOC
    - OpenLR
    - UTM / WGS 84 (e.g. mobile data from moving cars)

- Location referencing via „on-the-fly" map matching
  - more simple configuration process
  - easy interfacing to external systems

Coming back to the goal-settings

- **Cost effective:**
  - One (1) centre
  - 24/7/365 operating on one place, one equipment, one human resource

- **High quality of traffic performance:**
  - Traffic engineers optimize all parameters in one place, with one standard

- **Developable:**
  - Start with a first installation
  - Learn, optimize, enhance the system (on basis of the same architecture)
  - Extend the infrastructure over time, independent from new software development

⟹ **Know-how is concentrated at one place**

Example
National Traffic Management System

Traffic Management and Information Centre for Highways and Expressways in Austria - TMIC

- Operator: ASFINAG
- Responsible for 2,175 kilometres of highway

TMIC ASFINAG

Integration of 10 regional subcentres

- \> 1382 detection sites, 4006 sensors

- \> 1295 gantries carrying

- \> 6943 variable message signs VMS

- Archive is growing 7.9 GB per day

- Archive contains 2.312 TB

- Tunnel centre
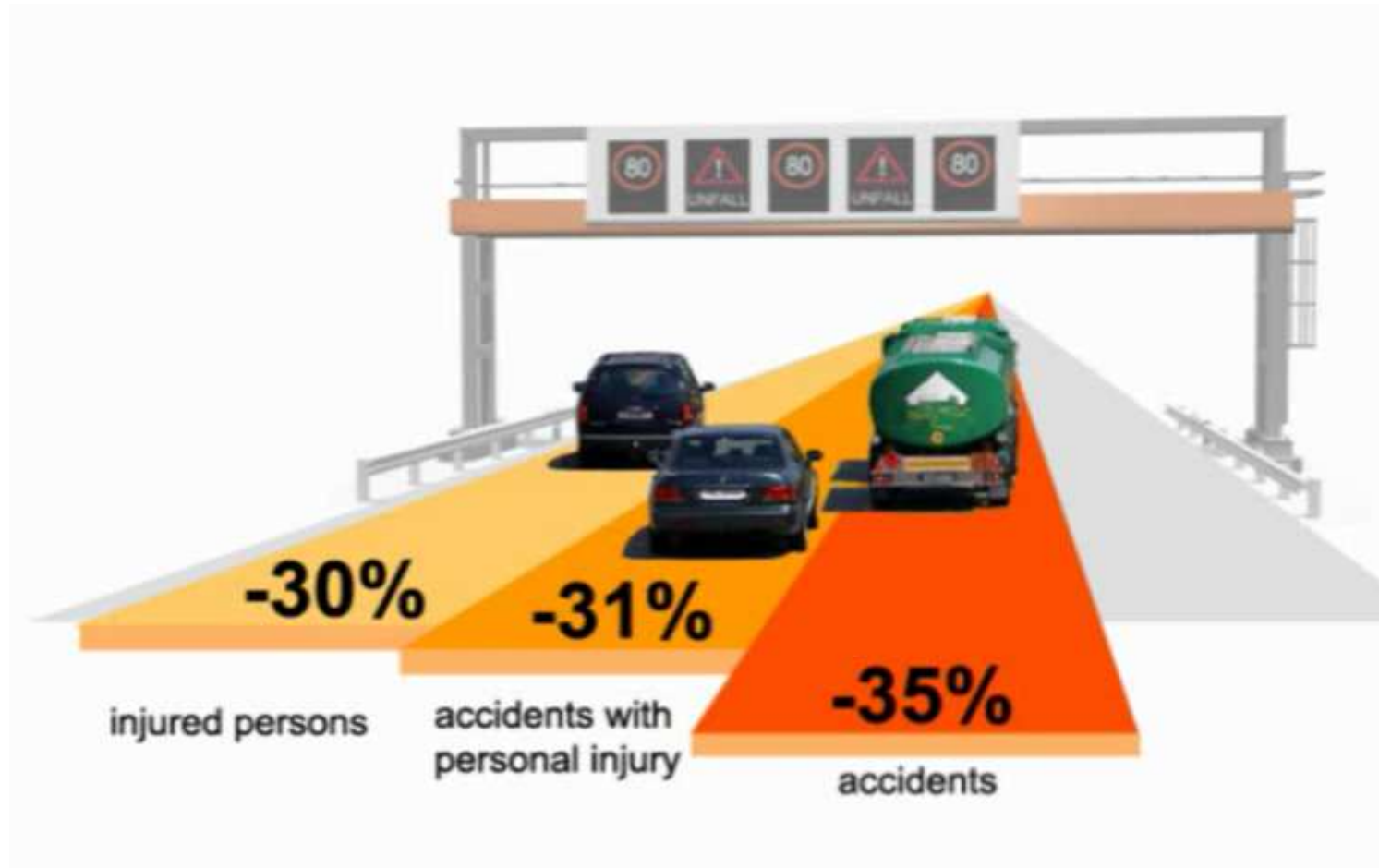data integration

TMIC ASFINAG
full coverage of functionality

- Actual and predicted traffic situation
- Traffic control
- Traffic information
- Road works management
- Traffic analysis system
- Data exchange with other countries
  (Italy, Germany, …)
- Message management

TMIC ASFINAG
Results

TMIC ASFINAG

- We built the system on basis of the core software **Geo***Dyn*2®
- together with mature components
- into a new, costumer-oriented system

- More than 20 years of experience contribute to **Geo***Dyn*2®
- **Geo***Dyn*2 ®:
  - **Geo** – Handling of geographic data
  - *Dyn* – Handling of dynamic mass-data

Why did the ASFINAG chose HB

- Experience in planning, developing and successful operation of TMC
- Handling of mass data
- Specific traffic engineering know-how
- Ability to integrate new technology
  - e.g. Cooperative traffic management (Car-2-car , Car-2-Infrastructure communication) - each car is sensor and actor

Thank you very much
for your attention!

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HEUSCH BOESEFELDT
Brains for roads